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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/088,738

07/23/2002

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33808F172

4589

441 7590 03/03/2008

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EXAMINER

SINGH, PREM C

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

03/03/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/088,738	Applicant(s) HUMBLLOT ET AL.	
	Examiner PREM C. SINGH	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/12/2008 has been entered.

Declaration

2. The Declaration under 37 CFR 1.132 filed 02/04/2008 is insufficient to overcome the rejection of claims 1-7 and 9-24 based upon the action and arguments dated:07/27/2007 as set forth in the last Office action because the Declaration is showing portions (page 2, 4, and 5) of original specification. The cited portions of the specification do not support the exclusion of tin from the coke inhibiting composition.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

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The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim requiring “in the absence of tin” is not supported in the original specification. Any negative limitation or exclusionary proviso must have basis in the original disclosure. If alternative elements are positively recited in the specification, they may be explicitly excluded in the claims. See *In re Johnson*, 558 F.2d 1008, 1019, 194 USPQ 187, 196 (CCPA 1977).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-6, 9-14, and 16-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann et al (US Patent 5,849,176) in view of Reed et al (US Patent 5,656,150).

9. With respect to claims 1-4 and 6, Zimmermann relates to the protection of tubular reactors or heat exchangers against coke formation in plants for converting hydrocarbons and other organic compounds at high temperatures in the gaseous phase (See abstract). Zimmermann further discloses pre-treatment of chrome-nickel steel with trimethyl-silyl-methyl mercaptan for 60 minutes at 880°C (See column 5, lines 49-54) and adds, "In place of compounds that simultaneously contain both silicon and sulfur,

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mixtures of silicon compounds and sulfur compounds also attain the same effect as coke formation inhibitors.” (Column 6, lines 52-57). Zimmermann further discloses “The compound containing silicon and/or sulfur is preferably selected from the group that consists of dimethyl sulfide, tetramethyl silane, and their mixtures. However, other volatile compounds can also be used.” (Column 2, lines 65-67; column 3, lines 1-3).

Zimmermann uses a mixture of hydrogen and methane during pre-treatment (see column 5, lines 51-53) and also discloses that additive compositions are also effective in the presence of steam (See column 7, lines 1-4) which is further evidenced by Reed ‘150 (See Reed: column 6, lines 5-15). Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Zimmermann invention and use steam in place of hydrogen/methane mixture because steam is equally effective with the composition, thus expected to be equally effective during pre-treatment of the steel surface. Use of steam in place of hydrogen/methane mixture will be more economical.

It is to be noted that Zimmermann’s disclosed compositions do not have tin.

Zimmermann uses a temperature of 880°C and a time of 60 minutes for pretreatment which lie between the claimed temperature and time ranges. In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. See *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

10. With respect to claim 5, Zimmermann discloses, “Figures 1-7 show in respect to pre-activated samples of chrome-nickel steel and samples that display a reduced coking

tendency due to special thermal pre-treatment with compounds containing silicon and sulfur, the dependency of coke formation rates on test time during the pyrolysis of n-heptane in nitrogen and in steam as the diluent when known coke formation inhibitors and inhibitors according to the invention are added.” (Column 3, lines 54-63).

Although Zimmermann uses nitrogen and steam as diluent separately, it would have been obvious to one skilled in the art at the time the invention was made to modify Zimmermann invention and use a mixture of steam and nitrogen as diluent because the mixture is also expected to be effective for coke inhibition due to the fact that the use of steam and nitrogen individually, is effective. See *In Re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

11. With respect to claims 7 and 15, Zimmermann does not specifically mention using hexamethyldisiloxane, but the invention does disclose, “Other volatile compounds can also be used, insofar as the object of the present invention is achieved.” (Column 3, lines 1-3).

Reed discloses a novel method for treating the radiant tubes of a fired pyrolysis heater with an antifoulant composition for inhibiting coke deposition. Reed uses several silicon compounds including hexamethyldisiloxane (See column 4, lines 32-62).

Since Zimmermann and Reed both inventions disclose coke inhibition on the inner tubes of a cracking reactor by using silicon compounds, it would have been obvious to one skilled in the art at the time the invention was made to modify Zimmermann invention and use hexamethyldisiloxane for coke inhibition as disclosed

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by Reed because this composition is also effective as other compositions disclosed by Zimmermann. See *In Re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958) and *In Re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982).

12. With respect to claim 9, Zimmermann discloses using di-methyl-di-sulfide (See column 4, lines 3-7).

13. With respect to claim 10, Zimmermann discloses, "In all cases the atomic ratio of silicon and sulfur is between 5:1 to 1:1". (Column 2, lines 48-49).

14. With respect to claim 11, Zimmermann discloses using 20 to 1000 ppm of the additive composition (See column 2, lines 29-31).

15. With respect to claims 12 and 21, Zimmermann discloses using normal pressure (1 atm pressure = 1.013 bar) (See column 4, lines 47-48).

16. With respect to claims 13 and 14, Zimmermann discloses, "On a pre-activated sample of chrome nickel steel dependence of coke formation rate on the test time during n-heptane pyrolysis without and with the addition of 85 ppm dimethyl disulfide is shown in figure 2." (Column 4, lines 3-7).

17. Claims 16-20 and 22-24 have all the limitations of claims 10 and 11, and discussed before.

Response to Arguments

18. Applicant's arguments filed 01/29/2008 have been fully considered but they are not persuasive.

19. The Applicant argues that the teachings in the original disclosure convey that the present invention did not teach use of a silicon compound as a mixture with tin compound because methods utilizing such compounds remains expensive and the long term effects of the tin on the metallurgy of the crackling tube and in the downstream sections are not known, so that the present process reduces coking with silicon containing sulfur compounds in the absence of tin. For these reasons, Applicants respectfully submit that the objection has been overcome and should be withdrawn. Applicants further state that subject matter which might be fairly deduced from the original disclosure is not new matter.

The Applicant's argument is not persuasive because the Specifications mention on page 4, "Patents US 4,692,243,.....downstream sections are not known". Then page 5 mentions, " Surprisingly.....cracking reaction". There is no link between these two paragraphs, the former citing prior art and the later citing the claimed invention. There should have been a linking statement excluding tin. Further, as per MPEP 2173.05 (i): any negative limitation or exclusionary proviso must have basis in the

original disclosure. If alternative elements are positively recited in the specification, they may be explicitly excluded in the claims. See *In re Johnson*, 558 F.2d 1008, 1019, 194 USPQ 187, 196 (CCPA 1977).

20. The Applicant argues that Zimmerman ' 176 is directed to materials that are added to the feed stock to be cracked rather than materials used in the pre-treatment stage as is the case in instant claim 1. The teachings of Zimmerman apply to adding compounds "to the feed". The citation relied upon by the examiner is to the summary of the invention and ignores the tenor of the disclosure set forth in Zimmermann ' 176. The reference is treating the feed stock as exemplified in the first full paragraph in column 3 of the reference. The intent of the reference is directed to treating input materials rather than being directed to treatment of any specific equipment being utilized in the processing of that feed. The requirements of equipment vary relative to materials used in the equipment and the reaction conditions occurring in that equipment. Page 4 of the present specification discusses the Zimmerman ' 176 reference. Zimmermann ' 176 does not teach "pre-treatment" within the context of the invention but only introduction of a material into feed material. The claims are neither anticipated by Zimmerman ' 176 nor obvious in view of Reed '150. Zimmerman '176 does not suggest the combination of the following characteristics of the process of present claim 1.

The Applicant's argument is not persuasive because Zimmermann '176 discloses figures 5 and 6 showing the effect of using a chrome-nickel-steel alloy pretreated with tri-methyl-silyl-methyl-mercaptan. Figure 5 shows rise in coke formation after 35 hours

of operation. Figure 6 shows that coke formation can be inhibited for the same pretreated alloy for about 60 hours if tri-methyl-silyl-methyl-mercaptan is added in the pyrolysis feed (See column 5, lines 49-67; column 6, lines 1-15). This clearly indicates that coke formation can be reduced by pre-treating the alloy with tri-methyl-silyl-methyl-mercaptan and also by adding the tri-methyl-silyl-methyl-mercaptan in the feed. Thus, Zimmermann '176 clearly discloses the claimed invention.

21. The Applicant argues that pre-treating the metal surface with a stream of steam is not taught by Zimmermann '176.

The Applicant's argument is not persuasive because Zimmermann '176 discloses pretreatment of the metal surface and use of steam as discussed under claim 1 above. Reed '150 is an evidence that steam can be used in the pretreatment (See Reed: column 6, lines 5-15).

22. The Applicant argues that the process of Zimmerman '176 consists in adding to the feed to be cracked (i.e. during cracking) an additive composition (see column 2 lines 29-34), which is a mixture of volatile organic compounds. Example 9 (column 6 lines 61-67) raised by the Office Action, actually discloses a pre-treatment as in Example 5, i.e., with tri-methyl-silyl-methyl-mercaptan at 880°C in an equimolar mixture of hydrogen and methane for 60 minutes, but it does not disclose a pretreating with a stream of steam comprising one non-sulphur-containing silicon compound and at least one non-silicon-containing sulphur compound. The Applicant further argues that the solution of pre-

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treatment of present claim 1 is thus neither disclosed nor suggested by Zimmermann '176.

The Applicant's argument is not persuasive because one skilled in the art would use steam in place of hydrogen/methane mixture because steam is more economical and equally effective with the coke inhibiting composition, as discussed under claim 1 above. Reed's disclosure also uses steam in the pretreatment operation. Thus, Zimmermann '176 teaches or suggests each and every element of claim 1.

23. The Applicant argues that Reed '150 uses tin.

The Applicant's argument is not persuasive because Reed '150 uses any element selected from the group consisting of phosphorus, aluminum, silicon, gallium, germanium, indium, tin, and any combination of two or more thereof (See column 4, lines 15-20).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 7:00 AM-3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Glenn A Caldarola/
Acting SPE of Art Unit 1797

/P. C. S. /022108
Examiner, Art Unit 1797

